Rocky Flats Environmental Technology Site

Building 776/777 Area VI Final Survey Report

Survey Unit:
776042

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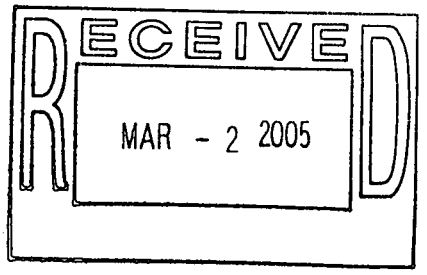
January 2005



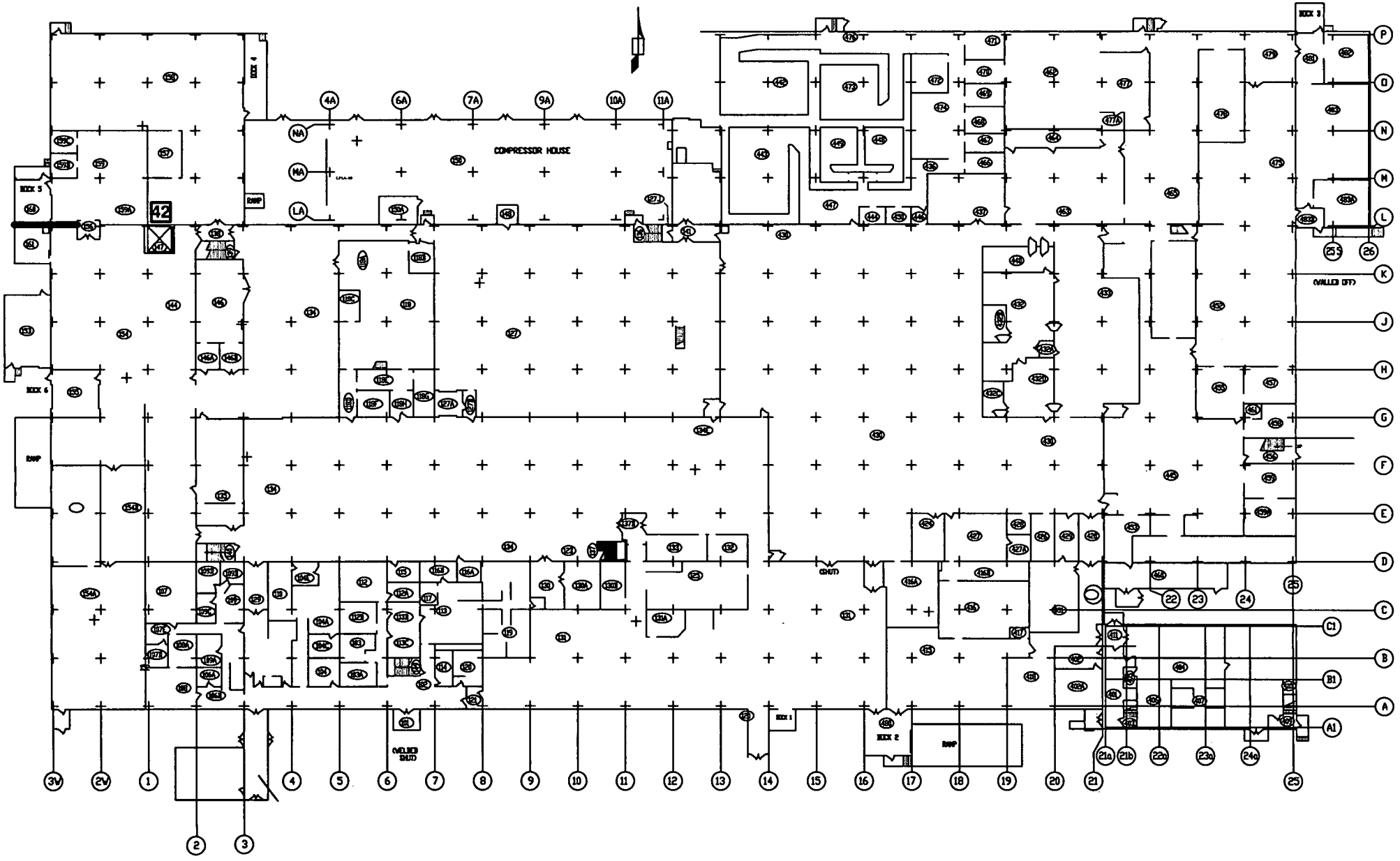
ADMIN RECORD

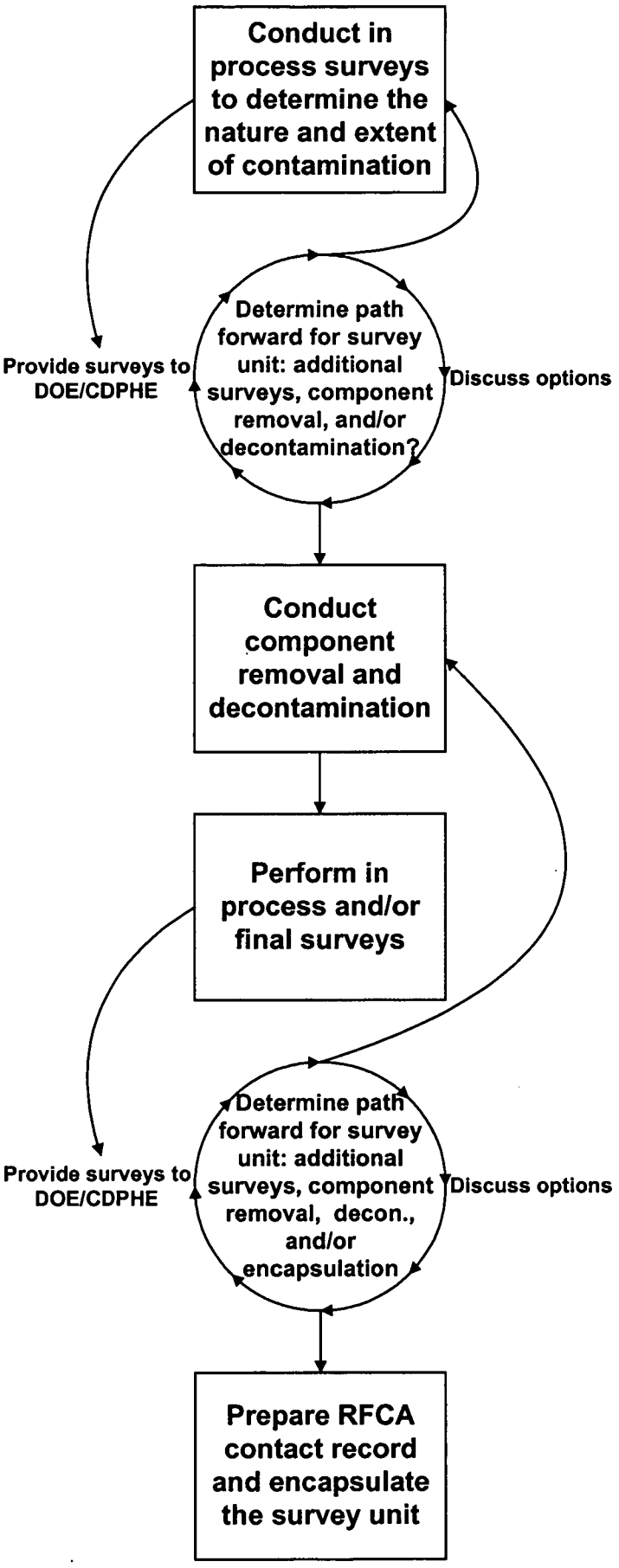
1/28

B776-A-000300

2

B776/777 SURVEY UNIT 776042
1st FLOOR




Conduct in process surveys to determine the nature and extent of contamination
Determine path forward for survey unit: additional surveys, component removal, and/or decontamination?
Provide surveys to DOE/CDPHE
Discuss options
Conduct component removal and decontamination
Perform in process and/or final surveys
Determine path forward for survey unit: additional surveys, component removal, decon., and/or encapsulation
Provide surveys to DOE/CDPHE
Discuss options
Prepare RFCA contact record and encapsulate the survey unit

In-Process Survey Instructions
Survey Unit 776042

Purpose:

This instruction provides guidance for collecting data needed to determine the contamination levels in Survey unit 776042. Work to be performed in accordance with " INS-535-Ludlum2350-1 with Sodium Iodide Detector" and. RSP-7.01 and 7.02.

Equipment and materials:

1) A Bicron G-5 detector (G-5) attached to a Ludlum 2350-1.

2) A Ludlum 44-17 detector (44-17) attached to a Ludlum 2350-1.

3) Probe holders for the G-5 and the 44-17 with tin side shield (side shield optional for the G-5).

4) Electra with attached DP-6, calibrated and daily response checked.

5) Access to a SAC-4 that has daily performance checks completed.

Procedure:

1) Inspect instruments for obvious damage and perform battery checks, as required.

2) Ensure the NaI instruments (G-5 and 44-17) are functioning by using Americium-241 source TS-912, counting the source for 60 seconds. Record readings from before and after survey (i.e., beginning and end of shift) on the daily response check sheet.

3) Obtain background measurements for floors, cement walls with NaI detectors in B777, room 404 or near Column A-5 in room 106B on the 1st floor of B-776. For ceilings take background measurement as specified below.

   - ✓ For floors and cement walls, place the detector (G-5 preferred or 44-17) in holder, 30 cm from floor and perform background measurement.

   - ✓ For block walls, place the detector (44-17 preferred or G-5) in holder, 30 cm from wall and perform background measurement.

   - ✓ For ceilings and metal surfaces in and on the elevator, background measurements will be taken in B777, room 404. Point probe towards ceiling, hold probe at waist. Place thin metal sheet over top of detector. Ensure that tin back shield covers back of probe, perform background measurement.

   Perform 60-second count for all background measurements. Record all results in the designated space on the data collection sheet (this may be the remarks section).

4) All floors and ceilings as well as the elevator walls should be scanned. Scan over the entire surface of each grid or step by holding the detector within 6 inches of the surface. Scan rate should be about 1 foot per second. Listen for change in count rate. Locate the point that has the highest reading in the area and take the measurement at that point (sample location). If no elevated reading is detected during the initial scan, then use professional judgement to select sample location most likely to be contaminated in the grid and take the measurement at that point.

5) Obtain NaI measurements.

- ✓ For floors, take a 60-second NaI measurement at 30 cm placing the detector (G-5 preferred or 44-17) in the holder and centering the detector over the sample location.

- ✓ The floor of the elevator and elevator shaft should be scanned and a reading shall be taken 30 cm above the location with the highest reading. Take reading at center of elevator if no higher readings is found.

- ✓ For walls, take a 30-second NaI measurement at 30 cm placing the detector (44-17 preferred) in the holder and centering the detector over the sample location. Take 30-second contact readings near wall penetrations (i.e., doorways) with elevated readings.

- ✓ Walls of the elevator should have one reading taken at the location with the highest reading for each wall. If no area is found to have a significantly high reading, take one reading 30 cm from center of wall.

- ✓ Walls of the elevator shaft shall be surveyed by taking one measurement every 10 feet along the center of each wall. No scanning is required.

- ✓ For ceilings, take a 60-second NaI measurement at 30 cm placing the 44-17 holder and centering the detector over the sample location. Ensure there is a tin back-shield on the detector.

Record all floor and ceiling data using the grid number as the sample location number, as appropriate (i.e., specific assigned numbers for floors and ceilings. Use assigned wall and section numbers for walls.

6) For all NaI measurements, mark area where detector was placed for each reading by circumscribing the area where the measurement was taken (if possible).

7) Note any items or conditions that may have affected any measurement in the "remarks" section of the data collection sheet.

Table 776042-1: Survey Requirements					
	Surface	**Type of Survey**	**Detector**	**Placement**	**Scan Rate / Count Time**
Background	Block Walls	Background measurement	Ludlum 44-17	30 cm of wall in B777, room 404.	60 seconds
	Floors, Stairs and Cement Walls and ceilings of the elevator Shaft	Background measurement	Bicron G-5 or Ludlum 44-17, as appropriate.	B777, room 404.	60seconds
	The elevator	Background measurement	Ludlum 44-17	B777, room 404 at waist level.	60 seconds
Scan	Floor	Total Alpha Activity	Preferred: Bicron G-5 Secondary: Ludlum 44-17	✓ Scan within 6" until highest reading is found	~ 1 foot per second
	Walls of elevator shaft	N/A	N/A	N/A	N/A
	Walls of Elevator	Total Alpha Activity	Ludlum 44-17	✓ Scan Within 6" until elevated reading is found	~ 1 foot per second
	Ceiling	Total Alpha Activity	Ludlum 44-17	✓ Scan Within 6" until elevated reading is found	~ 1 foot per second
NaI Measurements	Floor of elevator Shaft	Total Alpha Activity	Preferred: Bicron G-5 Secondary: Ludlum 44-17	30 cm	60seconds
	Floor and roof of Elevator	Total Alpha Activity	Preferred: Ludlum 44-17 Secondary: Bicron G-5	30 cm	60seconds
	Walls of elevator shaft	Total Alpha Activity	Preferred: Ludlum 44-17 Secondary: Bicron G-5	30 cm. On contact to investigate elevated readings.	30 seconds
	Ceiling	Total Alpha Activity	Ludlum 44-17	30 cm	60 seconds

Survey Instructions
Building 776 Area VI
Survey Unit 776042

Purpose:

This instruction provides guidance for collecting gross gamma and removable contamination data to quantify the amount of residual contamination in Survey Unit 776042 prior to demolition. NaI measurements are performed in accordance with " INS-535-Ludlum2350-1 with Sodium Iodide Detector".

Equipment and materials:

1. A Ludlum 44-17 attached to a Ludlum 2350-1 set to collect five-minute counts that will be displayed on its LCD window.
2. A Bicron G-5 attached to a Ludlum 2350-1 set to collect five-minute counts that will be displayed on its LCD window.
3. One Electra with attached DP-6, calibrated and daily response checked.
4. Two probe holders, one for the G-5 and one for the 44-17 with tin shielding.
5. Calibrated and daily response checked SAC-4.
6. Measuring tape or laser range finder.

Note: The NE Electra with DP-6 probe and the Eberline SAC-4 shall be used in accordance with RSP- 7.01 and 7.02

Procedure:

1. Inspect instrument for obvious damage and ensure battery voltage is equal to or greater than 4.6 volts. If battery voltage is less than 4.6 volts change the batteries.
2. Complete daily performance checks for Sodium Iodide detectors to ensure the instrument is functioning properly by using Americium-241 source TS-912. Record results on Sodium Iodide Data Sheet.
3. For floor and concrete wall background measurements, perform a 300-second background count with a Bicron G-5 for floors or Ludlum 44-17 for walls at background location in the northeast corner of Room 404 in B777. Record background counts next to "Bkg Floor" or "Bkg Concrete Wall"in background column of attached "Sodium Iodide Data Collection" sheets as needed.
4. For block wall background measurements, perform a 300-second background count with a Ludlum 44-17 at background location in the north east corner of room 404. Record background counts next to "Bkg Block Wall" in background column of attached Sodium Iodide data collection sheets as needed.
5. For ceiling background measurements, perform a 300-second background count with a Ludlum 44-17 at background location in the north east corner of room 404. Hold the probe waist high, pointed toward ceiling using a sheet metal plate in front of the detector (take background measurement in this configuration). Record background counts next to "Bkg Metal Ceiling" in background column of attached Sodium Iodide data collection sheets as needed.
6. Mark the sample locations on the surfaces to be measured. Take all measurements on contact with the marked surface using tin side shields on the Bicron G-5 and tin side and back shields on the Ludlum 44-17. All Sodium Iodide readings shall have 300 second count times.
7. Collect sodium Iodide, total surface activity and removable surface activity measurements at all locations marked on the attached map.
8. Record the NaI and NE Electra measurements on the attached sheet. Note any items or conditions that may have affected the measurement in the "remarks" section.
9. Count swipes for 60 seconds with a SAC-4, record result on attached sheet for removable contamination.

Table 776042-1: Survey Requirements				
Surface	**Type of Survey**	**Probe**	**Placement**	**Count Time**
Floor	Total Alpha Activity	Bicron G-5	On contact	300 seconds
All Surfaces	Total Alpha Activity	Electra with DP-6	On contact	60 seconds
Block walls	Total Alpha Activity	Bicron G-5 or Ludlum 44-17	On contact	300 seconds
All Surfaces	Removable Alpha	SAC-4	Swipe in placed in tray	60 seconds
Ceiling	Total Alpha Activity	Ludlum 44-17	On Contact	300 seconds
Block Walls	Background measurement	Bicron G-5 or Ludlum 44-17	On contact with wall at background location in room 404	300 seconds
Floors and cement walls	Background measurement	Bicron G-5 or Ludlum 44-17	On contact with floor at background location in room 404.	300 seconds
Metal ceilings	Background measurement	Ludlum 44-17	Probe waist high, pointed toward ceiling with sheet metal plate at background location in room 404.	300 seconds

Final Survey for Survey Unit 776042

FINAL SURVEY RESULTS
Survey Unit 776042

Scope

This report is prepared to summarize preliminary surveys of survey unit 776042. The surveys have been performed to determine the extent of contamination in the survey unit. As a result of the low levels of contamination and the lack of remediation required for this survey unit, the final survey was performed in conjunction with the in-process survey.

Survey Unit 776042 consists of Room 147 (the elevator and elevator shaft) located in the northwest portion of B776.

Historical Review

This survey unit was a non-process area. The elevator often served as a boundary between a radiological buffer area and a contamination area, which resulted in frequent surveys and adequate controls to protect the area from extensive contamination. The bottom of the shaft in survey unit 776042 was contaminated from the spread of water from the fire that occurred in 1969.

Incidental contamination on the upper portions of the shaft walls may have resulted from routine operations.

In-process Survey Methods and Techniques

Surfaces were evaluated for potential contamination using sodium iodide (NaI) detectors attached to single channel analyzers windowed for the 59 keV gamma–ray (241Am). The background measurements were taken in room 404 of building 777 for all points above grade. A multi-channel analyzer was used on the shaved floor outside of the elevator in the basement to establish a background location for the survey points in the basement and the bottom of the elevator shaft.

Measurements were taken at 30 cm. and on contact. For the 30-cm. measurements on the floors and ceilings, the survey technique involved scanning each grid location to find the highest reading and then taking the measurement at that point. For the 30-cm. measurements on the walls, the walls were scanned and one reading was taken for each ten by ten section of the wall at the location with the highest reading. This survey resulted in at least 90% of the walls being scanned. The remaining 10% was blocked by elevator equipment. It is not expected to be more contaminated than the areas surveyed.

Survey measurements on floors, walls and ceilings were taken on an established 10ft by 10ft grid pattern.

FINAL SURVEY RESULTS
Survey Unit 776042

PDS Methods and Techniques

The PDS survey results determine the Average Surface Contamination Value ($ASCV_u$) and source term for the survey unit. These parameters are used to determine whether the building may be demolished within the limits outlined in the "Radiological Pre-Demolition Survey Plan Building 776/777".

To comply with the "Radiological Pre-Demolition Survey Plan Building 776/777", a minimum of 30 survey points were selected per survey unit. A random start, systematic grid method was used to identify the survey point locations. Three types of surveys are performed at each survey point as follows:

- Painted surfaces are evaluated for potential contamination under coatings using sodium iodide (NaI) gamma detectors attached to a single channel analyzer windowed for the 59 keV gamma-ray (Am^{241}).
- Direct alpha surface contamination measurements are performed using a NE Electra survey instrument with attached DP-6 probe. This data may be compared to the NaI survey data to show the fraction of contamination that is directly on the surface verses imbedded in the material matrix.
- Removable surface alpha contamination surveys were performed by swiping the survey point with a 47mm filter paper then counting the filter paper on a SAC-4 alpha counter. This data may be used to determine the effectiveness of encapsulation following the PDS.

To conservatively determine the final Average Surface Contamination Value ($ASCV_u$) for the survey unit, the source term associated with inaccessible areas of the survey unit (as described below) is added to the source term calculated by the PDS survey.

ALARA Post-Remediation Surveys

Accessible Areas

The PDS is used to determine the Average Surface Contamination Value ($ASCV_u$) and source term for the survey unit.

Floors

The bottom of survey unit 776042 consists of concrete, much of which is often covered with water that seeps into the bottom of the shaft. The floor of the elevator is metal with a thin coat of paint on it. Localized areas of the bottom of the shaft were found to have elevated readings, greater than 100,000 dpm/ $100cm^2$. The highest contamination levels were found along the seam between the wall and the floor of the elevator shaft. Final survey point 15 was taken as close as possible to one of these seams. Survey point 14 is representative of floor contamination levels on the remainder of the floor. The contamination in the seam will be accounted for in an estimate of contamination in inaccessible areas below.

These areas were not remediated because the constant inflow of water and the tight spaces between the elevator fittings and equipment made decontamination of these areas unsafe. The bottom of the elevator shaft is almost 20 feet below existing grade, it

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is a point where water used for dust control during demolition will most likely accumulate. Maintaining the integrity of this floor will provide greater overall benefit than attempting to decontaminate the contaminated seam.

Walls

All of the walls of the elevator shaft are structural. The majority of the contamination on the walls is on the bottom two feet although there were two other locations found to have levels exceeding 100,000 dpm/ 100cm^2. The contamination on the bottom of the walls will be accounted for as inaccessible contamination because of the difficulties associated with decontaminating this area. Wall 3 had elevated readings near the elevator doors for the first and second floor. These areas would be difficult to decon because the fittings that hold the door in place and allow it to operate block much of the area. The in-process data for this wall was biased high by shine from the adjacent areas. Final survey points 9, 28 and 29 are located in areas of elevated contamination on wall 3 and are representative of these areas.

No decontamination was performed. No decontamination factor was calculated.

Table: 1

Wall summary

Wall	Section	Type	Initial Characterization:		
			Type I	Type II	Type III
776042-1	A	Structural	45,558		
776042-2	A	Structural	72,282		
776042-3	A	Structural	77,424		
776042-4	A	Structural	16,010		
776042-5	A	Elevator	3,240		
776042-6	A	Elevator	3,240		
776042-7	A	No Wall*	N/A		
776042-8	A	Elevator	3,240		
	Type I:	<100,000 dpm/100 cm^2			
	Type 2:	>100,000 dpm/100cm^2 to <1,000,000 dpm/100cm^2			
	Type 3:	>1,000,000 dpm/100cm^2			

* Elevator door is made of wire mesh

Ceilings-

Survey measurements revealed that all accessible ceiling surfaces in the survey unit are <50,000 dpm/100cm^2.

FINAL SURVEY RESULTS
Survey Unit 776042

Inaccessible Areas

Seam Between Floor and Wall at bottom of the Elevator Shaft

There are 48 feet (14.6 m) of contaminated seams around the bottom edge of the elevator shaft floor. The contamination levels ranged from 108,958 to 895,671 dpm/ 100cm^2. The average of six contact readings taken along the seam is 289,189 dpm/ 100cm^2. The slab is assumed to be 8 inches (0.2m) thick and the contamination level is assumed to be constant along each of the two sides of the seam. The contamination in the seam is estimated as follows:

*(2 *14.6 m * 0.2 m) * (289,189 dpm/100 cm^2 * 10,000 cm^2/m^2) * (1μCi/2.22E6 dpm) = 76 μCi*

Water mark on bottom 12 inches of elevator Shaft Walls

There is a stained area approximately 12 inches (0.3m) high along the bottom of the elevator shaft walls. This area was found to have elevated contamination levels averaging 254,000 dpm/100cm^2. Each wall is almost 12 feet long, the area has a total length of 48 feet (14.6m). The contamination remaining in the stained area is:

*(14.6 m * 0.3 m) * (254,000 dpm/100 cm^2 * 10,000 cm^2/m^2) * (1μCi/2.22E6 dpm) = 50.1 μCi*

The areas described above are in an area that will be flooded with dust suppression water during demolition. The rubble removed from this area is expected to be completely immersed in water as it is removed.

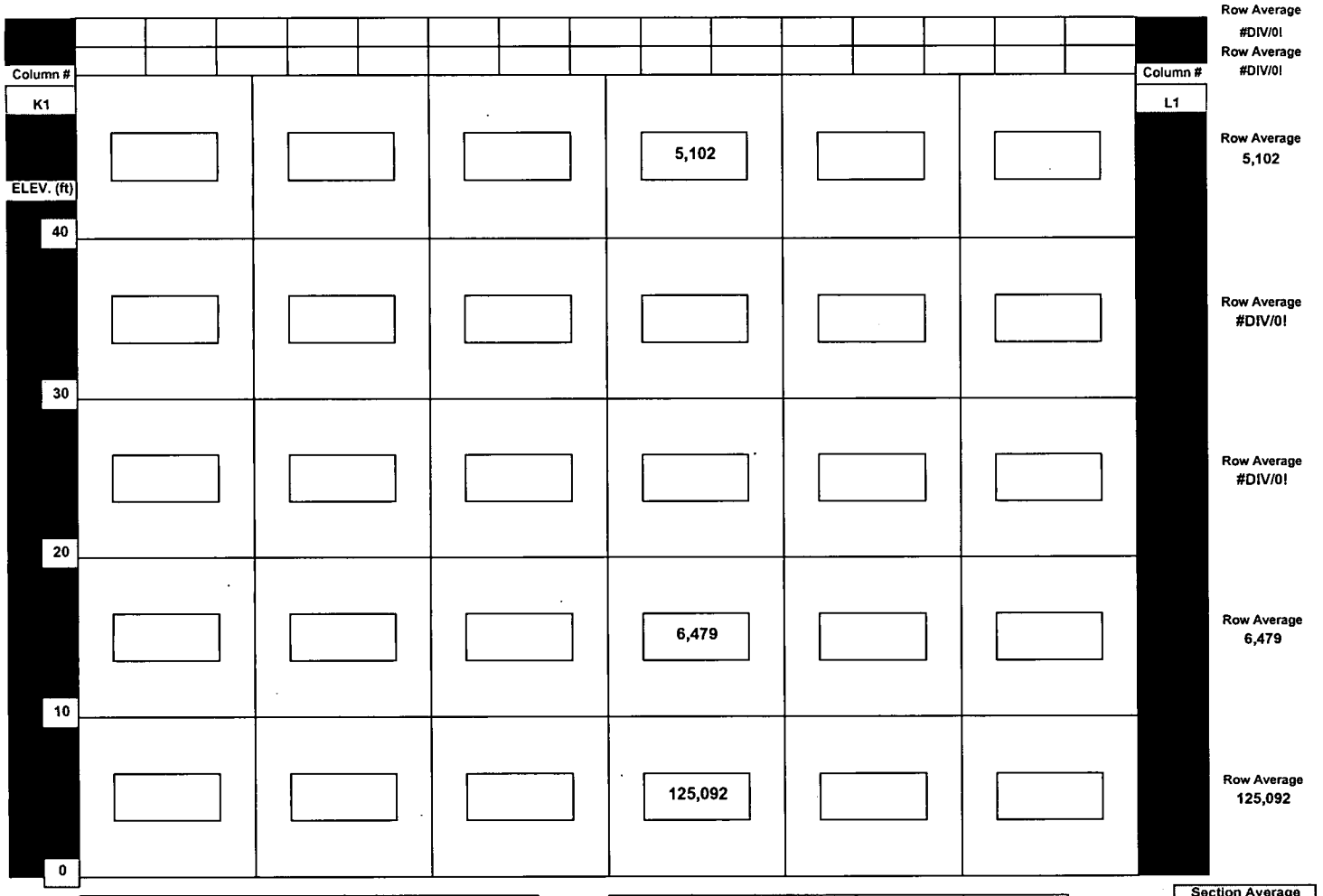
PDS Data Summary

In accordance with the "Radiological Pre-Demolition Survey Plan Building 776/777" the final survey total surface contamination values are used to determine the $ASCV_u$ for each survey unit. The results are summarized in Table 2 below (See Attachment 1 for calculation guidance):

Table 2:
PDS Final Results

	Final Results
776042 Inaccessible Area Source Term (μCi)	126.1
776042 Accessible Area Source Term (μCi)	415.5
776042 Total Source Term (μCi)	541.6
Survey Unit Wall, Ceiling, and Floor Area (m^2)	270
($ASCV_u$) (μCi/m^2)	2.0
($ASCV_u$) (dpm/100cm^2)	44,400

Unit	776042	Wall	1	Section	A	Date	11/16/04



Probe# 1	199765	Background 1	408
Efficiency 1	230	RCT 1	Fessenden
Contact Eff. 1	0.0800		

Probe# 2		Background 2	
Efficiency 2		RCT 2	
Contact Eff. 2			

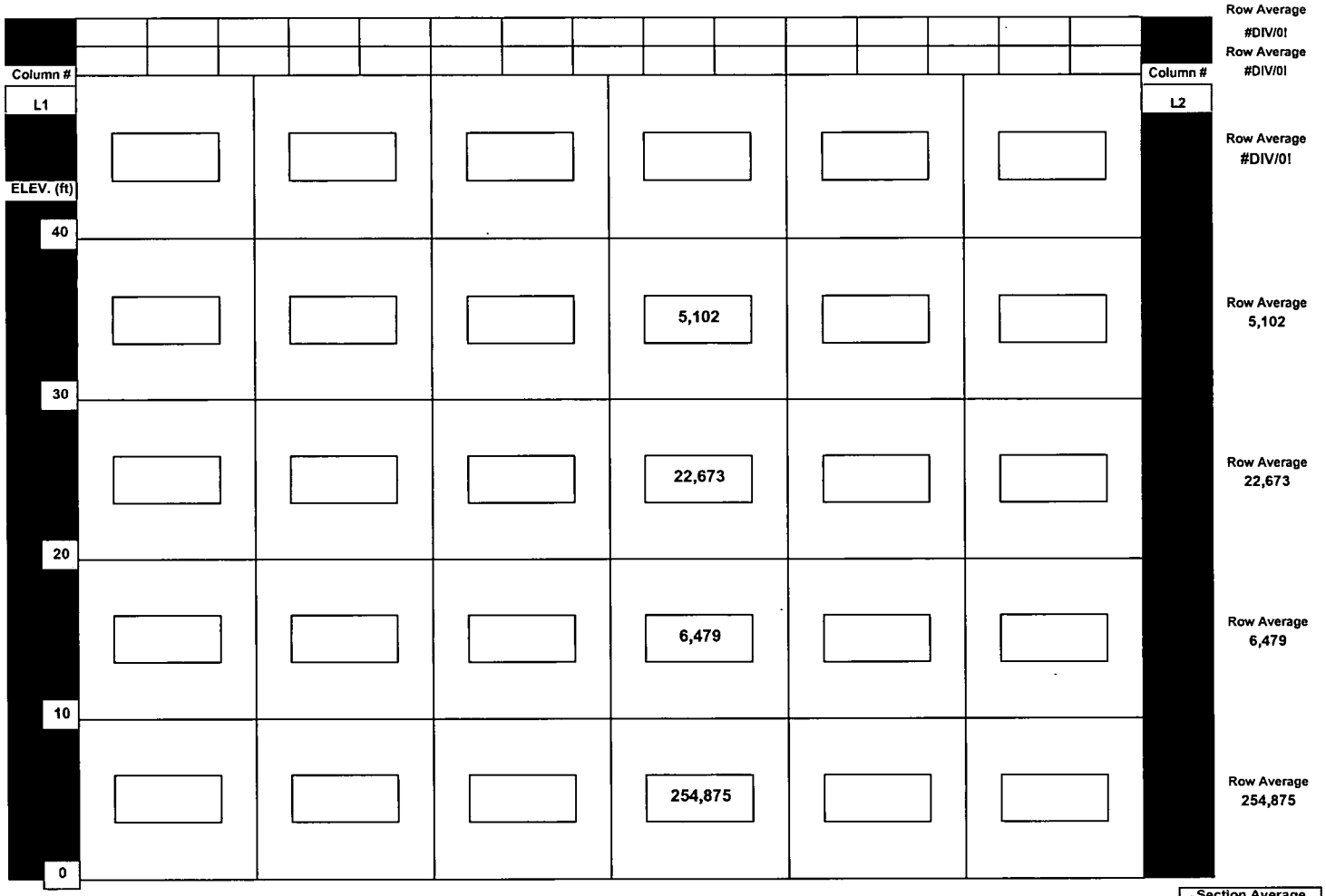
Section Average
45,558

dpm/100cm^2

Count Time (s)	30

p1

Unit	776042	Wall	2	Section	A	Date	11/16/04



Probe# 1	199765	Background 1	408
Efficiency 1	230	RCT 1	Fessenden
Contact Eff. 1	0.0800		

Probe# 2		Background 2	
Efficiency 2		RCT 2	
Contact Eff. 2			

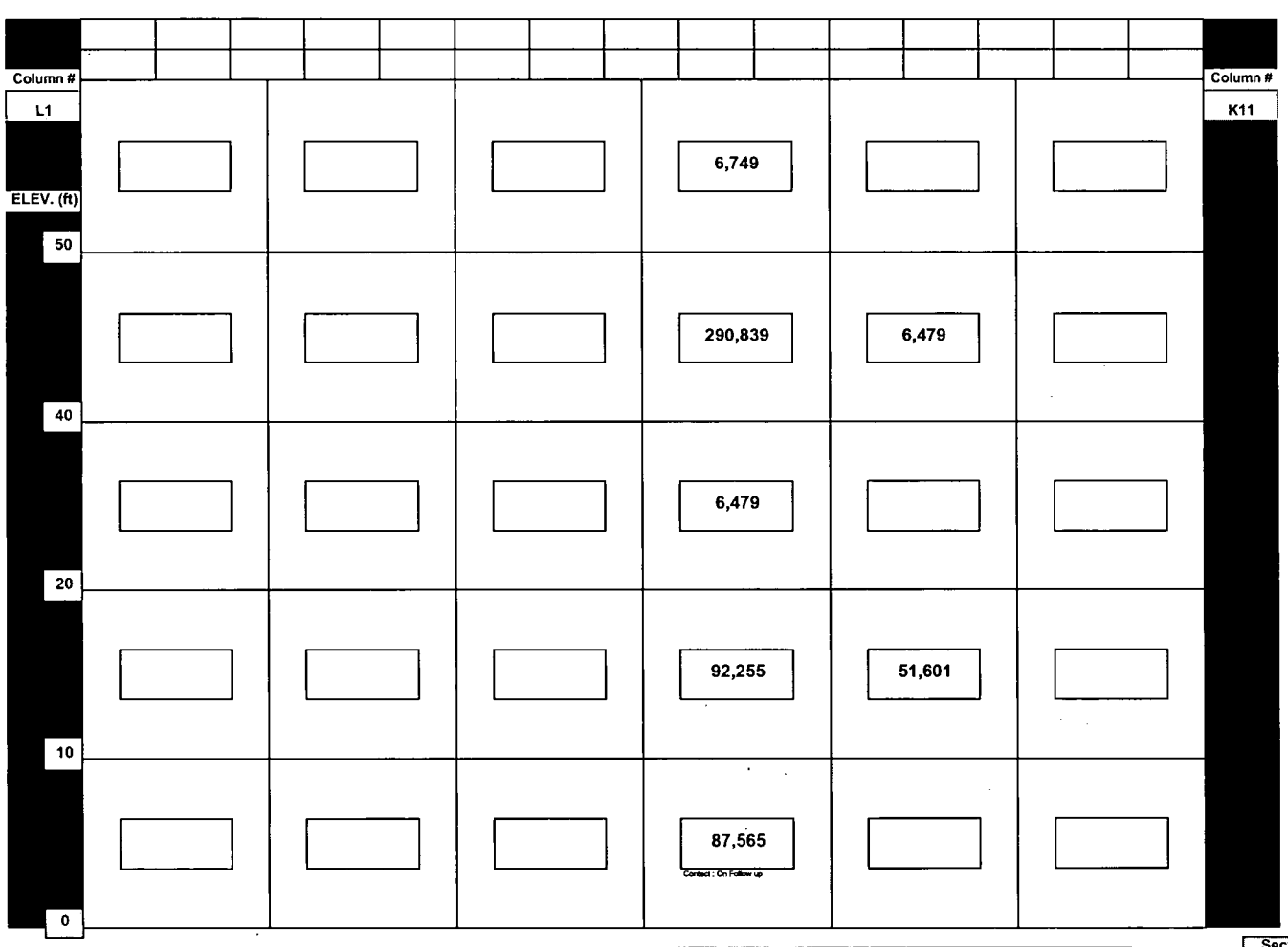
Section Average
72,282

dpm/100cm^2

Count Time (s)	30

15

Unit	776042	Wall	3	Section	A	Date	11/16/04



Probe# 1	119765	Background 1	408
Efficiency 1	230	RCT 1	Fessenden
Contact Eff. 1	0.0800		

Probe# 2		Background 2	
Efficiency 2		RCT 2	
Contact Eff. 2			

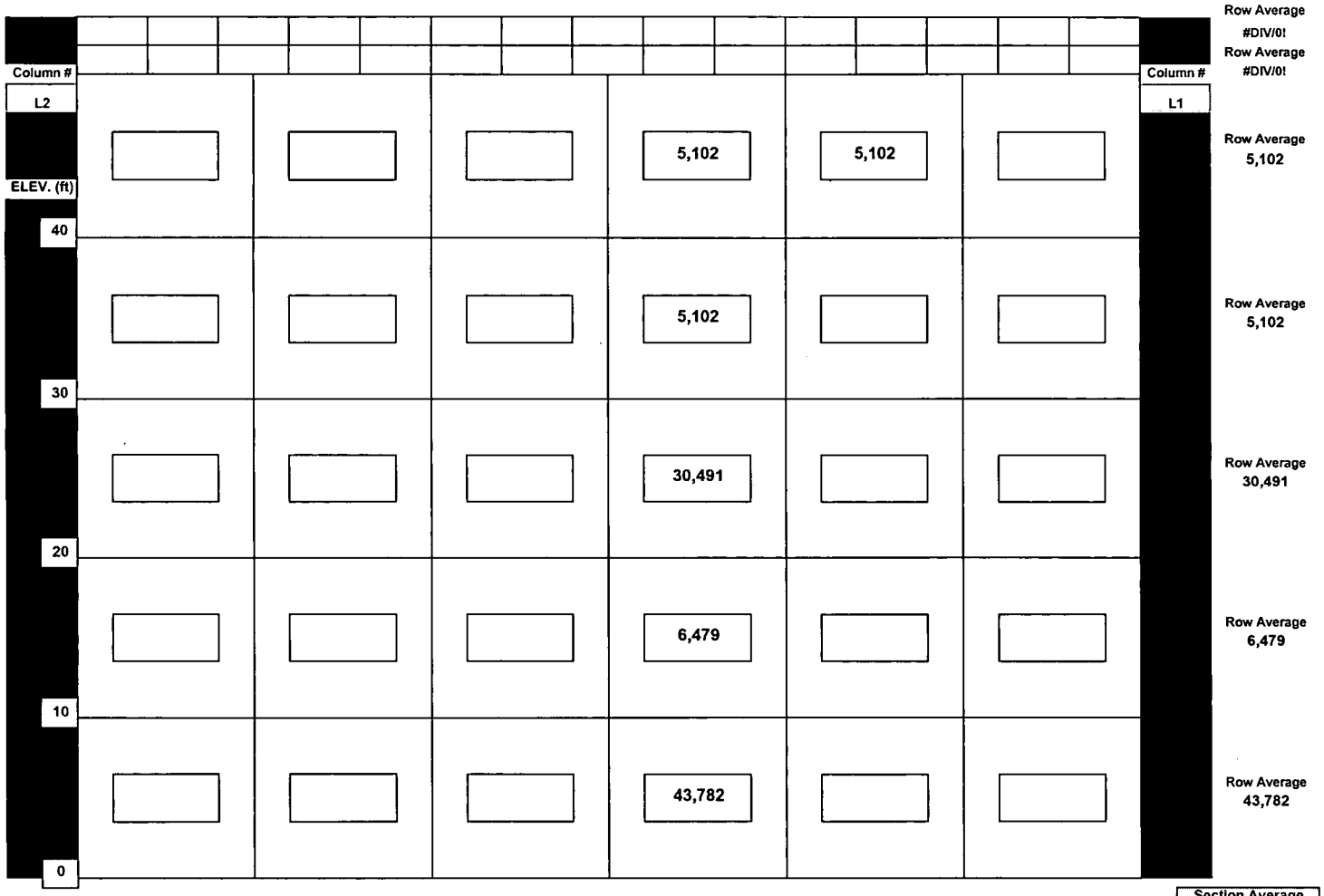
Section Average
77,424

dpm/100cm^2

Count Time (s)	30

16

Unit	776042	Wall	4	Section	A	Date	11/16/04



Row Average
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Row Average
#DIV/0!
Row Average
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Row Average
5,102
Row Average
30,491
Row Average
6,479
Row Average
43,782

Probe# 1	119765	Background 1	408
Efficiency 1	230	RCT 1	Fessenden
Contact Eff. 1	0.0800		

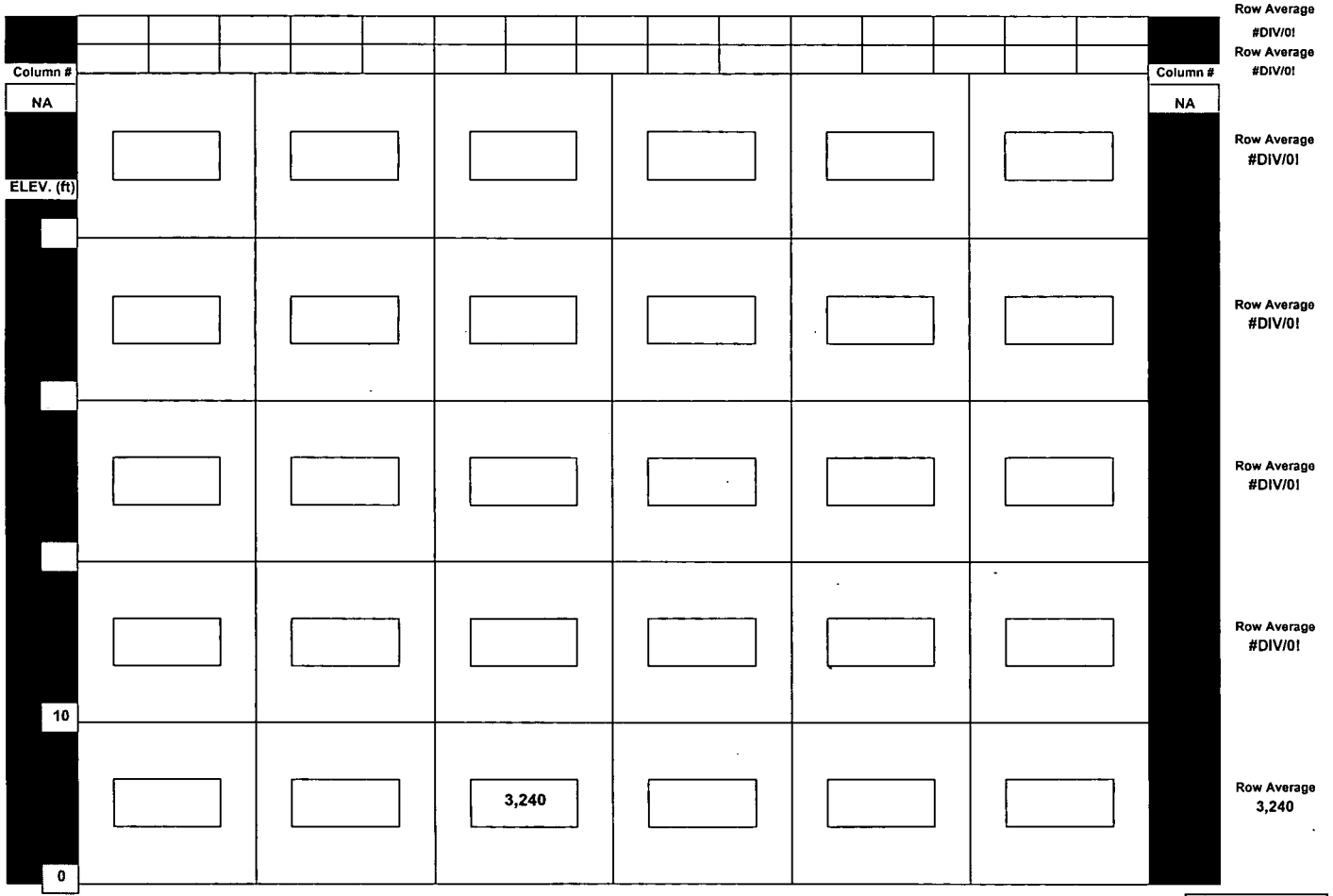
Probe# 2		Background 2	
Efficiency 2		RCT 2	
Contact Eff. 2			

Section Average
16,010

dpm/100cm^2

Count Time (s)	30

Unit	776042	Wall	5	Section	A	Date	11/16/05



Probe# 1	199765	Background 1	102
Efficiency 1	230	RCT 1	Fessenden
Contact Eff. 1	0.0800		

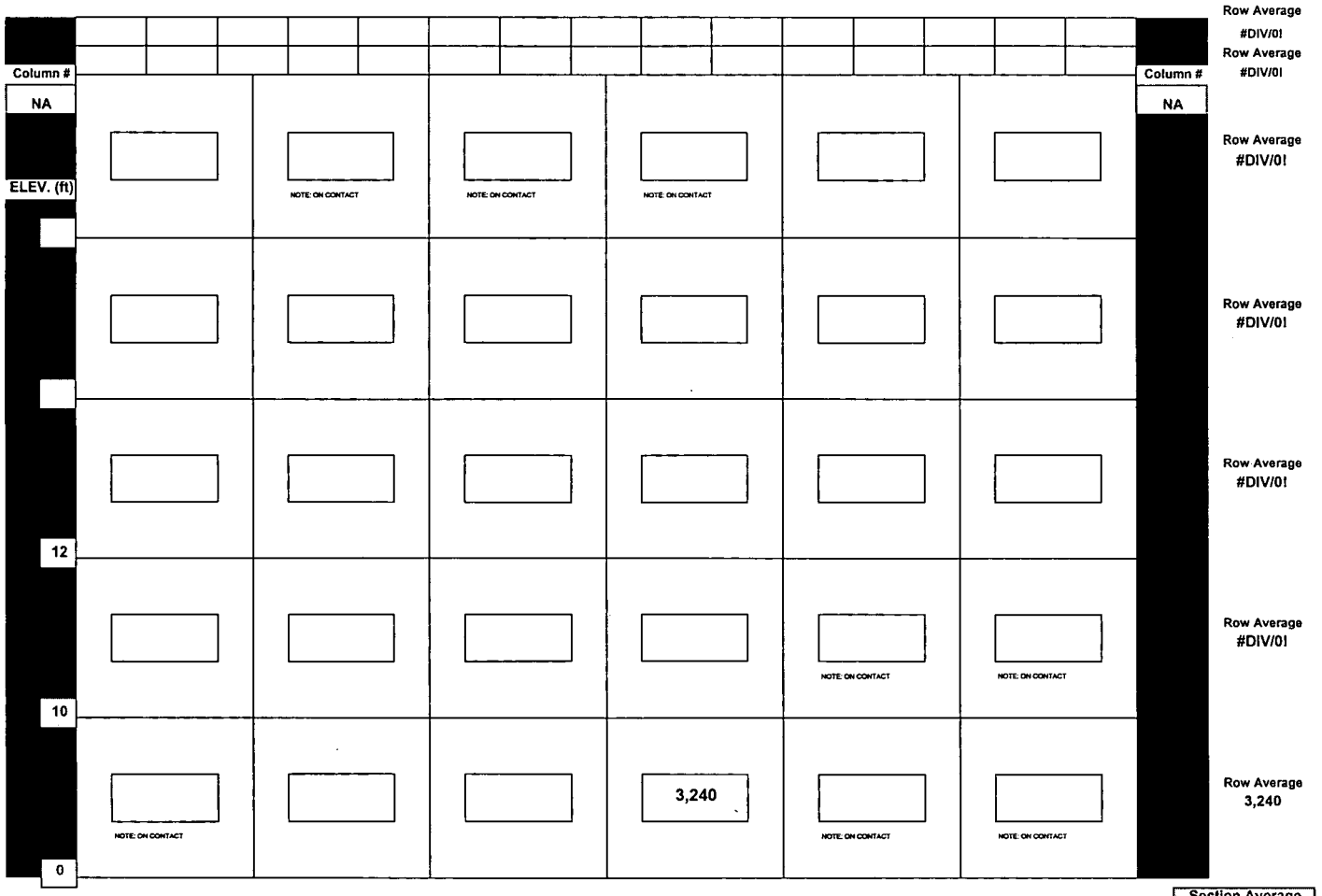
Probe# 2		Background 2	
Efficiency 2		RCT 2	Woods
Contact Eff. 2			

Section Average
3,240

dpm/100cm^2

Count Time (s)	30

Unit	776042	Wall	6	Section	A	Date	11/16/05



Probe# 1	199765	Background 1	102
Efficiency 1	230	RCT 1	Fessenden
Contact Eff. 1	0.0800		

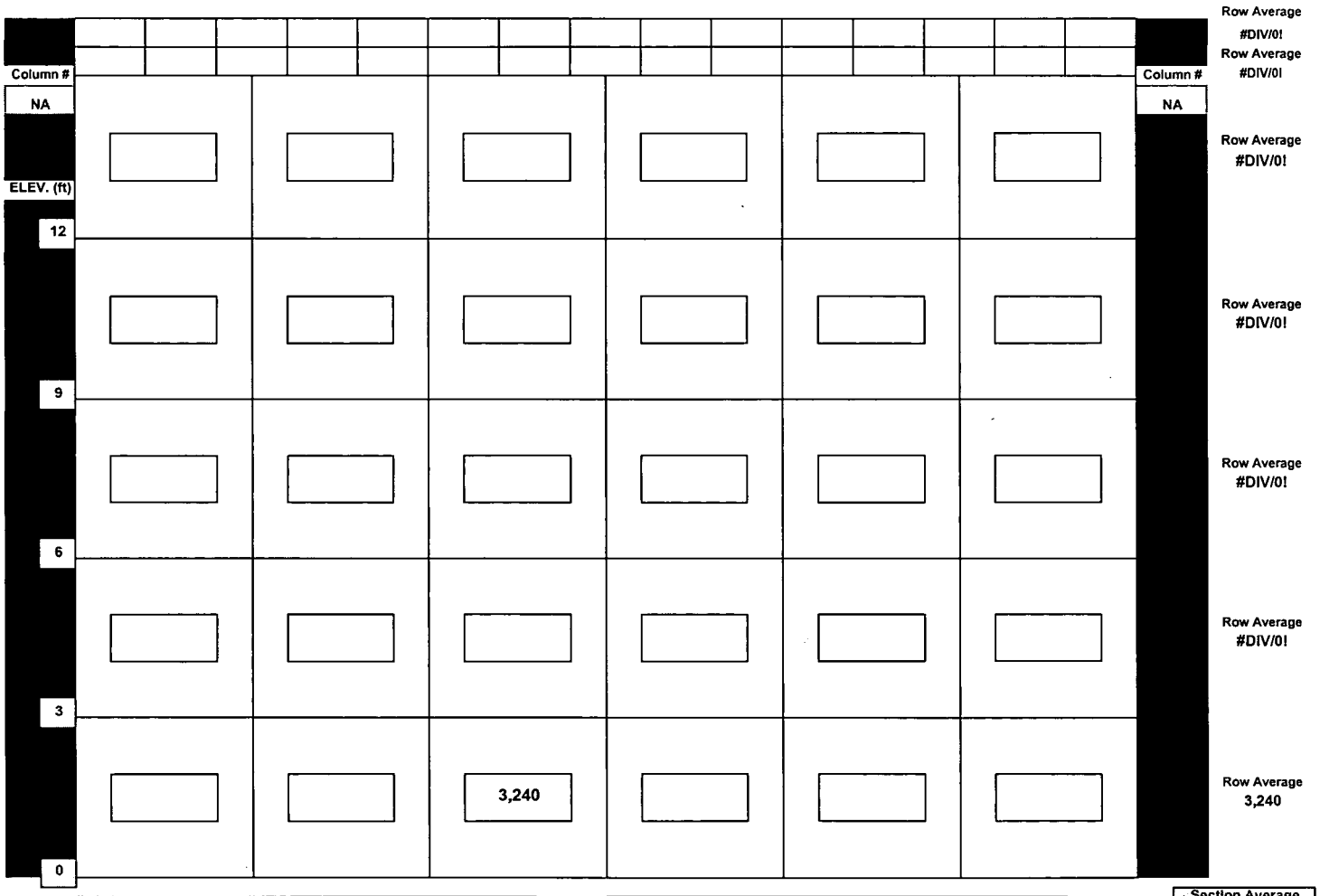
Probe# 2		Background 2	
Efficiency 2		RCT 2	Woods
Contact Eff. 2			

Section Average
3,240

dpm/100cm^2

Count Time (s)	30

Unit	776042	Wall	8	Section	A	Date	11/16/05



Probe# 1	199765	Background 1	102
Efficiency 1	230	RCT 1	Fessenden
Contact Eff. 1	0.0800		

Probe# 2		Background 2	
Efficiency 2		RCT 2	Woods
Contact Eff. 2			

Section Average
3,240

dpm/100cm^2

Count Time (s)	30

Contact Readings with Seam on Elevator Shaft Floor

Survey Area:	VI	Survey Unit:	776042	Survey Date(s):	11/21/04

Instrument Specifications

Instrument #	1	2
Meter Model:	Ludlum 2350-1	Ludlum 2350-1
Meter Serial #:	192614	192614
Detector Model:	Bicron G-5	Ludlum 44-117
Detector #:	B192N	B716T
Detector Size (cm^2):	125	125
Calibration Due Date:	12/10/04	12/10/04
Count Time (min)	1	5
Contact Efficiency	8.10%	6.40%

Ratio Used

Pu to Am - 241	8.1

Comments

In cases where the critical level is greater than the calculated dpm/100cm2, the critical level will be used for statistical analysis.

Count Times for backgrounds and samples are equal.

Attenuation Factors: Technician used 1/2 inch of paper absorbent to keep Detector dry. Attenuation coefficient is assumed to be the same as 1/2 inch of epoxy

Background (Gross)

Instrument #	1	2
Gamma (Ceilings)	N/A	N/A
Gamma (Floors)	1383	7237
Gamma (Block Walls)	N/A	N/A
Gamma (Solid Walls)	N/A	N/A

Background (cpm)

Instrument #	1	2
Gamma (Ceilings)	N/A	N/A
Gamma (Floors)	1383	1447.4
Gamma (Block Walls)	N/A	N/A
Gamma (Metal Walls)	N/A	N/A

Efficiencies (cpm/dpm)

Instrument #	1	2
Thin/No Paint	0.081	0.064
Epoxy	0.053	0.042
Other	0.034	0.027

Coatings	Thickness (inches)
damp concrete	0.003
Epoxy	0.500
other	1

Summary

MIN	71,143	dpm/100 cm^2
MAX	895,671	dpm/100 cm^2
Average	289,189	dpm/100 cm^2
STD DEV	289,750	dpm/100 cm^2

Contact Readings with Seam on Elevator Shaft Floor

Survey Area:	VI	Survey Unit:	776042	Survey Date(s):	11/21/04

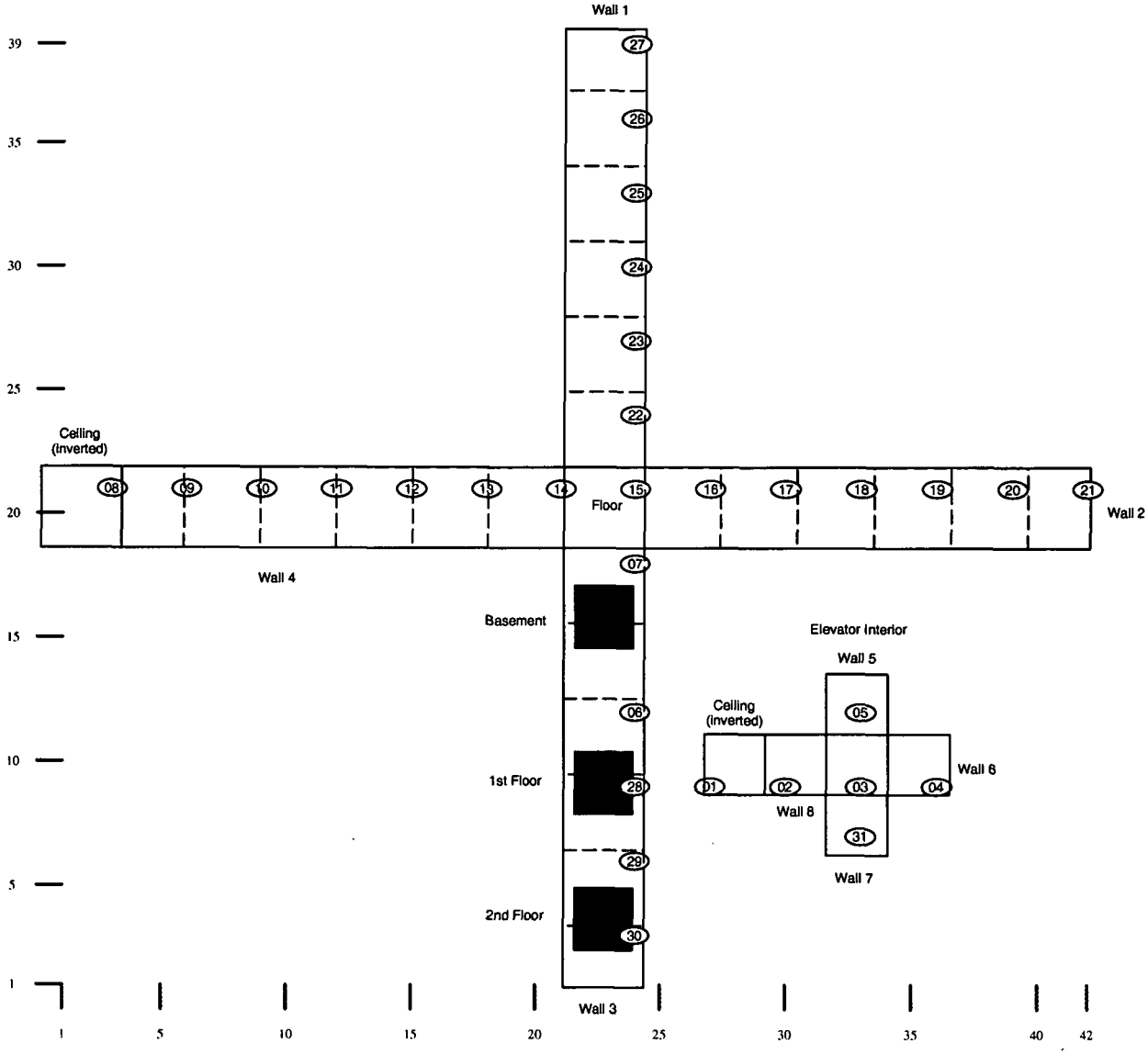
Sample Location #	RCT ID #	Instrument #	Gross Counts	Critical Level (dpm/100cm2)	Total Alpha (dpm/100cm2)
1	1	1	3871	6,939	199,553
2	1	1	4,138	6,939	220,968
3	1	1	2,785	6,939	112,449
4	1	1	2,270	6,939	71,143
5	1	1	2,825	6,939	115,657
6	2	2	51,354	4,018	895,671
7	2	2	27,377	4,018	408,886

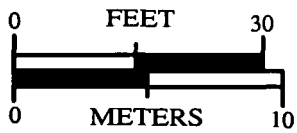
RADIOLOGICAL CLOSEOUT SURVEY FOR THE 776 CLUSTER

Survey Area: VI **Survey Unit: 776042** **Classification: NA**
Building: 776
Survey Unit Description: First floor- Equipment elevator (Room 147)

Total Floor Area: 17 sq. m **Total Area: 270 sq. m** **Random Start Grid Size: 3 x 3 sq. m**

SURVEY UNIT 776042 - MAP 1 OF 1





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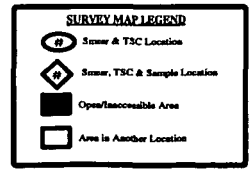

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Total Surface Activity

Survey Area:		VI	Survey Unit:		776042			
Meter Model:		NE Electra w/ DP6 Probe					Dates Counted:	11/16/04
Instrument #:		4062	n/a	n/a	n/a	n/a	A priori MDA:	94
Cal. Due Date:		12/28/04	n/a	n/a	n/a	n/a	Avg. Local Bkgd	9.2
Efficiency (c/d):		0.221	n/a	n/a	n/a	n/a	Avg. Efficiency	0.221
Sample Location #	RCT ID #	Inst. #	Instrument (cpm)		Local Bkgd (cpm)		(dpm/100 cm^2)	
1	1	4062	24		8		72.4	
2	1	4062	24		7		76.9	
3	1	4062	84.0		7.0		348.4	
4	1	4062	15.0		10.0		22.6	
5	1	4062	14.0		9.0		22.6	
6	1	4062	5.0		7.0		-9.0	
7	1	4062	176.0		5.0		773.8	
8	1	4062	21.0		8.0		58.8	
9	1	4062	17.0		10.0		31.7	
10	1	4062	20.0		11.0		40.7	
11	1	4062	16.0		5.0		49.8	
12	1	4062	14.0		4.0		45.2	
13	1	4062	16		7		40.7	
14	1	4062	332		7		1470.6	
15	1	4062	417		8		1850.7	
16	1	4062	7		6		4.5	
17	1	4062	9		7		9.0	
18	1	4062	6		9		-13.6	
19	1	4062	5.0		10.0		-22.6	
20	1	4062	9.0		11.0		-9.0	
21	1	4062	68.0		7.0		276.0	
22	1	4062	9.0		5.0		18.1	
23	1	4062	8.0		7.0		4.5	
24	1	4062	8.0		7.0		4.5	
25	1	4062	10.0		9.0		4.5	
26	1	4062	7		8		-4.5	
27	1	4062	27		7		90.5	
28	1	4062	16		5		49.8	
29	1	4062	12		10		9.0	
30	1	4062	9		9		0.0	
						MIN	-22.6	
						MAX	1850.7	
						MEAN	177.2	
						SD	434.6	

TSA Data

Removable Activity

Survey Area:		VI	Survey Unit:		776042
Dates Counted:	11/16/04				
A priori MDA:	16				
Efficiency (c/d)	0.333				
Smear Location Number	Smear Results				
	RCT ID #	Serial Number	Gross (cpm)	Bkg.	(dpm/100 cm^2)
1	1	847	12.0	0.1	35.7
2	1	828	9.0	0.5	25.5
3	1	1051	9.0	0.3	26.1
4	1	1479	9.0	0.3	26.1
5	1	847	15.0	0.1	44.7
6	1	828	21.0	0.5	61.6
7	1	1051	183.0	0.3	548.6
8	1	1479	12.0	0.3	35.1
9	1	847	9.0	0.1	26.7
10	1	828	33.0	0.5	97.6
11	1	1051	9.0	0.3	26.1
12	1	1479	12.0	0.3	35.1
13	1	847	6.0	0.1	17.7
14	1	828	48.0	0.5	142.6
15	1	1051	21.0	0.3	62.2
16	1	1479	24.0	0.3	71.2
17	1	847	9.0	0.1	26.7
18	1	828	6.0	0.5	16.5
19	1	1051	21.0	0.3	62.2
20	1	1479	12.0	0.3	35.1
21	1	847	9.0	0.1	26.7
22	1	828	12.0	0.5	34.5
23	1	1051	9.0	0.3	26.1
24	1	1479	27.0	0.3	80.2
25	1	847	6.0	0.1	17.7
26	1	828	6.0	0.5	16.5
27	1	1051	6.0	0.3	17.1
28	1	1479	12.0	0.3	35.1
29	1	847	9.0	0.1	26.7
30	1	828	6.0	0.5	16.5
				MIN	16.5
				MAX	**548.6**
				MEAN	**57.4**
				SD	97.0

PDS Sodium Iodide Instrument Information

Survey Area:	VI	Survey Unit:	776042	Survey Date(s):	11/18/04

Instrument Specifications

Instrument #	1	
Meter Model:	Ludlum 2350-1	Ludlum 2350-1
Meter Serial #:	201199	192614
Detector Model:	Ludlum 44-117	Ludlum 44-117
Detector #:	15157	B716T
Detector Size (cm^2):	17.8	125
Calibration Due Date:	3/2/05	12/10/04
Count Time (min)	5	5
Contact Efficiency	7.90%	6.40%

Background (Gross)

Instrument #	1	2
Gamma (ceilings)	593	2510
Gamma (Floors)	1613	7237
Gamma (Block Walls)	1194	N/A
Gamma (Other Walls)	1613	N/A

Background (cpm)

Instrument #	1	2
Gamma (ceilings)	118.6	502
Gamma (Floors)	322.6	1447.4
Gamma (Block Walls)	238.8	N/A
Gamma (Metal Walls)	322.6	N/A

Efficiencies (cpm/dpm)

Instrument #	1	2
Thin/No Paint	0.079	0.064
Epoxy	0.064	0.052
Other	0.075	0.061

Ratio Used

Pu to Am - 241	8.1

Comments

In cases where the critical level is greater than the calculated dpm/100cm2, the critical level will be used for statistical analysis.

Count Times for backgrounds and samples are equal.

Attenuation Factors: Contamination is assumed to be in a thin layer of fixative or water on outer surface of substrate.

Coatings	Thickness (Inches)
Thin/No Paint	0.003
Epoxy	0.250
Other	0.06

PDS Sodium Iodide Instrument Information

Survey Area:	VI	Survey Unit:	776042	Survey Date(s):	11/19/04
					1/19/05

Instrument Specifications

Instrument #	1	2
Meter Model:	Ludlum 2350-1	Ludlum 2350-1
Meter Serial #:	201199	
Detector Model:	Ludlum 44-17	Ludlum 44-17
Detector #:	15157	199764
Detector Size (cm^2):	17.8	17.8
Calibration Due Date:	3/2/05	6/9/05
Count Time (min)	5	5
Contact Efficiency	7.90%	9.20%

Ratio Used

Pu to Am - 241	8.1

Comments

In cases where the critical level is greater than the calculated dpm/100cm2, the critical level will be used for statistical analysis.

Count Times for backgrounds and samples are equal.

Attenuation Factors: Based on observation of Walls and Ceilings. Epoxy on Floor determined by chip sampling.

Background (Gross)

Instrument #	1	2
Gamma (Ceilings)	335	N/A
Gamma (Floors)	N/A	1567
Gamma (Walls)	1170	1567

Background (cpm)

Instrument #	1	2
Gamma (Ceilings)	67	N/A
Gamma (Floors)		313.4
Gamma (Walls)	234	313.4

Efficiencies (cpm/dpm)

Instrument #	1	2
Thin/No Paint	0.078	0.091
Epoxy	0.064	0.074
Other	0.075	0.087

Coatings	Thickness (inches)
Thin/No Paint	0.015
Epoxy	0.250
Other	0.06

Sample Location Number	NaI Activity Measurements				
	Measurement Used	Comment	Surface	Coating	(dpm/100 cm^2)
1	Sodium Iodide	N/A	Ceiling	Thin/No Paint	6,543
2	Sodium Iodide	N/A	Wall	Thin/No Paint	9,356
3	Sodium Iodide	N/A	Floor	Thin/No Paint	2,366
4	Sodium Iodide	N/A	Wall	Thin/No Paint	6,543
5	Sodium Iodide	N/A	Wall	Thin/No Paint	6,543
6	Sodium Iodide	N/A	Wall	Thin/No Paint	39,732
7	Sodium Iodide	N/A	Wall	Thin/No Paint	101,179
8	Sodium Iodide	N/A	Ceiling	Thin/No Paint	6,543
9	Sodium Iodide	N/A	Wall	Thin/No Paint	9,285
10	Sodium Iodide	N/A	Wall	Thin/No Paint	88,455
11	Sodium Iodide	N/A	Wall	Thin/No Paint	34,073
12	Sodium Iodide	N/A	Wall	Thin/No Paint	41,927
13	Sodium Iodide	N/A	Wall	Thin/No Paint	58,674
14	Sodium Iodide	N/A	Floor	Thin/No Paint	32,868
15	Sodium Iodide	N/A	Floor	Thin/No Paint	112,331
16	Sodium Iodide	N/A	Wall	Thin/No Paint	10,792
17	Sodium Iodide	N/A	Wall	Thin/No Paint	34,881
18	Sodium Iodide	N/A	Wall	Thin/No Paint	10,792
19	Sodium Iodide	N/A	Wall	Thin/No Paint	9,286
20	Sodium Iodide	N/A	Wall	Thin/No Paint	9,286
21	Sodium Iodide	N/A	Wall	Thin/No Paint	9,286
22	Sodium Iodide	N/A	Wall	Thin/No Paint	17,210
23	Sodium Iodide	N/A	Wall	Thin/No Paint	39,732
24	Sodium Iodide	N/A	Wall	Thin/No Paint	71,957
25	Sodium Iodide	N/A	Wall	Thin/No Paint	9,286
26	Sodium Iodide	N/A	Wall	Thin/No Paint	9,286
27	Sodium Iodide	N/A	Wall	Thin/No Paint	9,286
28	Sodium Iodide	N/A	Wall	Thin/No Paint	97,945
29	Sodium Iodide	N/A	Wall	Thin/No Paint	120,080
30	Sodium Iodide	N/A	Wall	Thin/No Paint	9,285
				MIN	**2,366**
				MAX	**120,080**
				AVERAGE	**34,160**
				SD	**36,275**

NaI Survey Summary

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